Exhibit 7

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

HEADWATER RESEARCH LLC, Plaintiff, v. CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS and VERIZON CORPORATE SERVICES GROUP INC., Defendants,	CIVIL ACTION NO. 2:23-cv-00352

DECLARATION OF DR. DONALD TURNBULL

I, Don Turnbull, hereby declare:

1. OVERVIEW

1. I am over the age of 18 and am competent to make this Declaration. I am a citizen of the United States and a resident of the State of Texas.

2. I make this Declaration at the request of Cellco Partnership d/b/a Verizon Wireless and Verizon Corporate Services Group Inc. (collectively, "Defendants") in connection with a claim construction proceeding in the above-captioned case.[1] Specifically, I have been asked to share my opinions regarding the meaning of certain terms of U.S. Patent Nos. 8,589,541 (the "'541 Patent") and 9,215,613 (the "'613 Patent) (collectively, the "Asserted Patents"), as understood by a person having ordinary skill in the art at the time of those patents ("POSITA"). I have been told the

[1] I reserve the right to offer rebuttal and/or additional opinions regarding claim construction or other issues on behalf of the Defendants for this matter.

Defendants intend to submit this declaration to the Court in support of their arguments regarding the proper construction of these terms. My opinions and bases for my opinions are set forth below.

3. I am being compensated at my standard consulting rate of $875 per hour for my time spent in connection with preparing this declaration. My compensation is not dependent on my testimony or the outcome of this proceeding.

4. In reaching the conclusions stated in this declaration, I have relied upon my own personal knowledge and experience.

2. QUALIFICATIONS

5. A full description of my educational background, professional achievements, qualifications, and publications in the past 30+ years are set forth more fully in my curriculum vitae, which is attached to this Declaration as Exhibit A. Here, I provide a brief summary of my background and qualifications.

6. I am an accomplished researcher and creator of innovative, patented and trade-secreted technologies related to information retrieval, e-commerce, personalization, mobile interfaces, behavioral modeling, content organization, and analytics. I am also the author of numerous academic publications, including: a textbook on Web-based information seeking (i.e., how people search and browse the Internet) and knowledge work (i.e., how technology enables people to work on complex tasks); mobile systems and mobile application design; articles on human-computer interaction design, personalization for Web information retrieval and recommender systems; and numerous definitive works on information architecture methodologies, software interface design, and software development.

7. My experience includes helping software companies, from small startups to large corporations, create new technologies and applications. To advise these companies, I research and

monitor academic and industry technology developments to keep up-to-date regarding advances in the field. I am also aware of the history of software development from my professional and academic experience over the past 30 years.

8. I also have experience and knowledge working with user interfaces, such as on mobile apps, and their integration into assisting users in their environment. I have also taught a number of software design and development courses at the graduate level including mobile systems, networked multimedia, interaction design, the semantic web and data analytics among others. In particular, I have been heavily involved with computing systems that collect data on user behavior (such as selecting content in an interactive computing environment). I have talked at industry and academic conferences on mobile, pervasive computing, and personalization, including on collection and evaluation of user interactions and content analysis.

9. I received my undergraduate degree at the University of Texas at Arlington in 1988, with an emphasis in computer science. Upon graduating, I took a position at a small software company in Dallas that developed expert systems software that automated the processing and optimizing the digital documents for either print or screen based on sets of rules and heuristics.

10. In 1991, I moved to Atlanta to work in an emerging, exciting area of software called CASE (Computer Aided Software Engineering). I designed and built software that helped other programmers build their own software applications. Since I had researched and built document-oriented applications, and understood hypermedia and hypertext, I also worked on specific applications that helped people build more modern graphical user interface (GUI) applications that could run on Windows or Macintosh systems, and still connect to corporate computer systems. I also designed document authoring and editing applications to compile interactive, multimedia hypertext systems within the GUI operating systems. These systems gave KnowledgeWare

software users an interactive, pop-up help in a graphical browser window that included hyperlinks and a search function, much like the emerging Web browser applications and interfaces. As part of my work, I used and prototyped applications in the first World Wide Web browser on the NeXT Computer. The NeXT Web browser resembled modern Web browsers, and displayed documents as their authors wanted them, with fonts and links to other documents hosted all over the world accessible via the internet.

11. I returned to graduate school in 1994 at the Georgia Institute of Technology ("Georgia Tech") in a new graduate-only research department that focused on Internet technologies. This was when the Internet had started to become very popular, and my own work with hypertext, graphical interactive Web browsers and application programming had already prepared me to move in this research direction. As a graduate student at Georgia Tech, I worked on several projects that focused on hypermedia design and the Internet. In late 1994, I configured and ran a very early Web site (approximately the 8500th site on the Web). This early Web site featured an interactive survey, which utilized a database system and email-processing application working in concert with the interactive Web browser. I also worked on a new kind of automated Internet search tool, which (while not ready for commercial use) illustrated many ideas related to smarter Internet searching and understanding user preferences to present recommended resources. In early 1995, I also worked with a research team at Georgia Tech that developed a modified NCSA Mosaic Web browser that offered a Graphic History View of browsing history in a separate window, which featured a tree-like structure of the links followed on Web pages, including thumbnail graphics of each Web page in the background.

12. My master's thesis at Georgia Tech focused on automatically generating large interactive hypermedia Web sites (large sets of Web pages, focused on a topic) through stored

multimedia Web content in a database, which could be used to "publish" a subset of pages onto the Web, based on an author's filtering criteria. In 1995, I earned an M.S. in Information Design and Technology from the Georgia Institute of Technology with my thesis, entitled "Object-Oriented Information Development: A Methodology and System for Large-Scale Hypertext Documents."

13. After Georgia Tech, I went to IBM's first U.S. Internet group, where I was a Lead Technical Architect and worked on a number of related projects that dealt with graphical user interfaces and networked systems using Internet technology. I also contributed to designs and advised on numerous other ongoing Internet-focused projects at IBM, including Web site development tools for eCommerce small business Web sites, large enterprise (intranet) Web sites including portals, as well as the foundations for a Web site usability practice at IBM to evaluate Web use of IBM software and server-based applications.

14. In 1996, pursuant to my doctoral studies at the University of Toronto, I researched Internet technologies including Web browser functionality, protocols, and interfaces that are still used today on desktop computers, but also in mobile devices and other inter-networked hardware and software. I developed a client application called WebTracker that worked as a usage history data collection agent in deep concert with Web browsers to collect a user's Web browser activity including the application functionality of the Web browser itself (e.g. opening a bookmark or searching a Web page, etc.) and the history of Web services accessed (e.g. using a Web-based application or interacting with a Web server, etc.). I also researched user-interaction design as well as the underlying algorithms to predict and recommend user information needs assistance.

15. In 2002, at the University of Toronto, I finished my doctoral dissertation, entitled "Knowledge Discovery in Databases of Web Use: A Search for Informetric and Behavioral Models

of Web Information Seeking." A large component of my research was collecting and analyzing very large-scale network access datasets (gigabytes) and develop models that showed how users and their client computers were using the internet and Web as a platform with application usage and information services.

16. Later that year, I returned to Texas and accepted a faculty position at the University of Texas at Austin. As an assistant professor, I continued to pursue my research and taught graduate students on advances in subjects such as Web Information Retrieval Evaluation & Design (search), Information Architecture (including the history of hypertext and multimedia systems), Interaction Design & Human Computer Interaction (HCI), Web Analytics, the Semantic Web, and Knowledge Management systems. All of my courses focused on using interactive computer systems in networked environments to empower people to use information and interact with their computing environments.

17. During my time at the University of Texas, I conducted a variety of research projects, published numerous academic papers, and presented at academic and industry conferences. The projects included analyzing network traffic data, developing mobile device applications and interfaces, as well as qualitative and quantitative user behavior data collection and analytics. In addition to my work on campus, I also provided consulting advice on system design to companies outside the university, including small technology startups as well as large corporations such as Microsoft and Motorola. Part of this industry work was focused on mobile devices, interfaces and applications ranging from PDAs, early smartphones and the iOS and Android platforms. Throughout these early days of mobile devices, I have been a research, designer and developer for these platforms and operating systems and this continues to today.

18. I currently work with various software companies—from small startups to large corporations—to create new technologies and applications. In this role, I continue to monitor academic and industry advances in information systems. In over 30 years as a developer, professor, researcher, and software architect, I have read, and become familiar with, a large part of the rich history of development and design work in the field of computer science. As a software developer and designer, I personally witnessed and contributed to the early development of personal computers with graphical user interfaces, Web-based systems, and Web site development, as well as the growth of mobile networked computing. I have designed and built applications and systems for research and commercial uses, with a focus on practical, business-oriented tools. My work has used data in novel and transformative ways to move commerce from the real world to the Internet, thereby aiding the growth of e-commerce systems for finding, recommending, and sharing items to purchase.

19. In sum, I have extensive experience—as a developer and researcher—relating to computing devices and network-based systems. I have developed tools to collect, organize, and store user interaction data, and implement systems that can leverage user data to make using computing devices smarter and easier.

20. In addition, I have analyzed the following materials in addition to the other materials I cite throughout this Declaration:

- U.S. Patent No. 8,589,541 ("the '541 Patent") and its file history;
- U.S. Patent No. 8,924,543 ("the '543 Patent") and its file history;
- U.S. Patent No. 9,198,042 ("the '042 Patent") and its file history;
- U.S. Patent No. 9,215,613 ("the '613 Patent") and its file history;
- Petition for *inter partes* review in IPR2024-00942 and accompanying papers;

- Petition for *inter partes* review in IPR2024-00943 and accompanying papers;
- Petition for *inter partes* review in IPR2024-00944 and accompanying papers;
- Petition for *inter partes* review in IPR2024-00945 and accompanying papers;
- Defendants' Disclosure of Proposed Claim Constructions;
- Plaintiff's Disclosure of Proposed Claim Constructions;
- Defendants' P.R. 4-2 Exchange of Preliminary Proposed Claim Constructions and Extrinsic Evidence; and
- Plaintiff's P.R. 4-2 Exchange of Preliminary Proposed Claim Constructions and Extrinsic Evidence.

3. LEGAL PRINCIPLES

21. I have been informed and understand that claim construction is the process by which the Court determines the proper meaning and scope of the claims.

22. I am not a lawyer, but Defendants' counsel has informed me about the legal principles that apply in construing patent claims. As a general matter, I understand that the words of a claim are generally understood to have their plain and ordinary meanings as those words would have been understood by a POSITA based upon that person reading the claim terms themselves, the terms in the context of the claim in which they appear, the entire patent specification, including the figures, and the file history of the patent and related patents. I also understand that terms must be construed based upon a complete understanding of what the inventor actually invented and intended to be covered (as evidenced in the patent and file history) by the claim in which the terms appear.

23. I also understand that an inventor can use terms in a manner other than in their plain and ordinary meaning by clearly, deliberately, and precisely defining those terms in the patent

specification or in the file history. This is referred to as acting as a "lexicographer." It is my understanding that if the specification reveals a special definition given to a claim term by the patentee that differs from the ordinary and customary definition of that term, then the patentee's definition applies. In such cases, the specification acts as a dictionary that defines terms used in the claims.

24. I also understand that the "intrinsic evidence," which includes the claims, the specification, and the file history, including post-grant proceedings before the United States Patent and Trademark Office ("PTO"), are the most important tools for determining the meaning of a claim term, but that "extrinsic evidence," such as dictionaries, textbooks, and other publications, may also provide guidance about the meaning of a claim term.

25. I also understand that if a claim term, read in light of the specification and the prosecution history, fails to inform a POSITA with reasonable certainty about the scope of the invention, then the claim term is indefinite. My understanding is that a claim is considered indefinite if it does not allow a POSITA to understand with reasonable certainty the scope of the invention when read in light of the specification. To meet the definiteness requirement, a claim must be sufficiently precise to permit a potential competitor to determine whether they are infringing.

26. I further understand that if a claim contains an element that is indefinite, then the claim is invalid.

4. PERSON OF ORDINARY SKILL IN THE ART

27. I understand that the terms in the Asserted Patents must be read as they would have been understood by a POSITA at the time of the invention.

28. I have also been advised that a POSITA is a hypothetical person to whom the claimed subject matter pertains with the capability of understanding the scientific and engineering principles applicable to the pertinent art. I understand that the following factors may be considered in determining the level of ordinary skill: type of problems encountered in the art; prior art solutions to those problems; speed with which innovations are made; sophistication of the technology; and educational level of active workers in the field. I also understand that not every factor may be present and that one or more factors may predominate.

29. I understand that Defendants have previously identified a POSITA to be a person with at least a bachelor's degree in computer science, computer engineering, or a similar field, and approximately two years of industry or academic experience in a field related to computer software development and/or computer networking. Based on my knowledge and experience, the materials and information I have reviewed, and my experience in the technical areas relevant to the '541 and '613 Patents, I do not disagree with this definition.

5. OVERVIEW OF THE PATENTS AT ISSUE

30. I understand that the Plaintiff has asserted infringement of four patents in the above-captioned case.

31. I have been asked to address the disputed claim terms in the '541 and '613 Patents, and specifically with respect to whether certain disputed claim terms are indefinite.

A. Overview of the '541 Patent

32. The '541 Patent is titled "Device-assisted services for protecting network capacity." It issued on November 19, 2013 from U.S. Application No. 13/134,028, filed May 25, 2011.

33. The '541 Patent claims priority to or claims to be a continuation or continuation-in-part of over eight columns of "Related Applications." I have been informed by Defendants'

counsel that Plaintiff asserts that all claims of the '541 Patent have a priority date of January 28, 2009. For the purposes of preparing this declaration, I have been asked to assume that all claims of the '541 Patent are, in fact, entitled to a priority date of January 28, 2009.

34. As its title suggests, the '541 Patent discloses means of involving a wireless device in the process of controlling usage of network resources. The specification explains that "[w]ith the advent of mass market digital communications, applications and content distribution, many access networks such as wireless networks, cable networks and Digital Subscriber Line (DSL) networks are pressed for user capacity." '541 Patent at 1:34–37. This strain on user capacity is described as arising, at least in part, from the fact that "user service consumption habits are trending toward very high bandwidth applications and content that can quickly consume the available capacity and degrade overall network service experience." *Id.* at 1:50–58. Accordingly, the specification explains that "managing the wireless access connection capacity and network access connection resources is important to maintain network performance as network resources/capacity demand increases." *Id.* at 10:5–8.

35. The '541 Patent specifically identifies an issue in this context where, "if multiple and/or all devices allow all applications to indiscriminately access or attempt to access network resources or transmit/receive traffic, then the network can generally become overloaded." *Id.* at 10:35–43. This results in "poor network performance." *Id.* at 10:43–51. Contributing to this issue is the fact that "[d]evice OEMs have recently created wireless devices that are designed more like standard Internet devices and not fully optimized to preserve network capacity and resources"—*e.g.* smartphones—which "are not as frugal or sparing with wireless network access bandwidth" as traditional wireless devices. *Id.* at 11:28–34.

36. The specification acknowledges that "[n]etwork carriers have typically attempted to manage network capacity using various purely central/core network based approaches." *Id.* at 15:52–56. The specification points out several purported limitations of these "[p]urely centralized network solutions with no assistance from a device based software agent." *See id.* at 15:52–16:12. For instance, "for some device applications, OS functions or other service usage activities, if the activity is blocked somewhere in the network behind the base station after over the air (OTA) spectrum bandwidth is consumed to open or begin to open a communication socket, then there can still be an appreciable amount of network capacity or resources consumed even though the data transfer is not allowed to complete." *Id.* Additionally, "purely centralized network solutions" may have "no mechanisms or support to link to a device user interface (UI) to inform the user what is happening and why it is happening." *Id.*

37. To purportedly address this issue, the '541 Patent thus discloses "[u]sing Device Assisted Services (DAS) techniques, and in some cases, network assisted/based techniques, to provide for network service usage monitoring of devices." *Id.* at 16:45–57. Specifically, the specification discloses means of "differentially controlling these types of network service usage activities in various ways depending on the type of service activity requesting network access and/or requesting transactions with network resources." *Id. at* 15:13–18. For instance, the "differential" control of different "service usage activities," such as applications on a wireless device, may involve "classifying one or more network service activities associated with an application or OS function to a background service class, while other network service activities associated with that application or OS function are classified to other service classes (e.g., or to different background service class priority levels)." *See id.* at 18:39–55.

38. The claims of the ’541 Patent recite computer-readable storage media that include instructions for controlling data usage by applications on a wireless device. The ’541 Patent specifically discloses “differentially” controlling “service usage activities” based on its “type” when it “request[s] network access.” ’541 Patent at 15:13–18. A “service usage activity” comprises a “prospective or successful communication over a wireless network.” *Id.*, cl. 1. This is accomplished through the use of a “policy” for “controlling the service usage activity” to “protect network capacity.” *Id.* at 18:8–19:58. This “policy” is applied to the “service usage activity” if that activity is determined to “comprise[] a background activity.” *Id.*, cl. 1.

39. Figure 14 discloses an illustrative embodiment of the steps recited in the independent claim of the ’541 Patent for controlling network usage by a particular “service usage activity.” Figure 14 is described in the ’541 Patent as “a flow diagram for device assisted services (DAS) for protecting network capacity in accordance with some embodiments.”

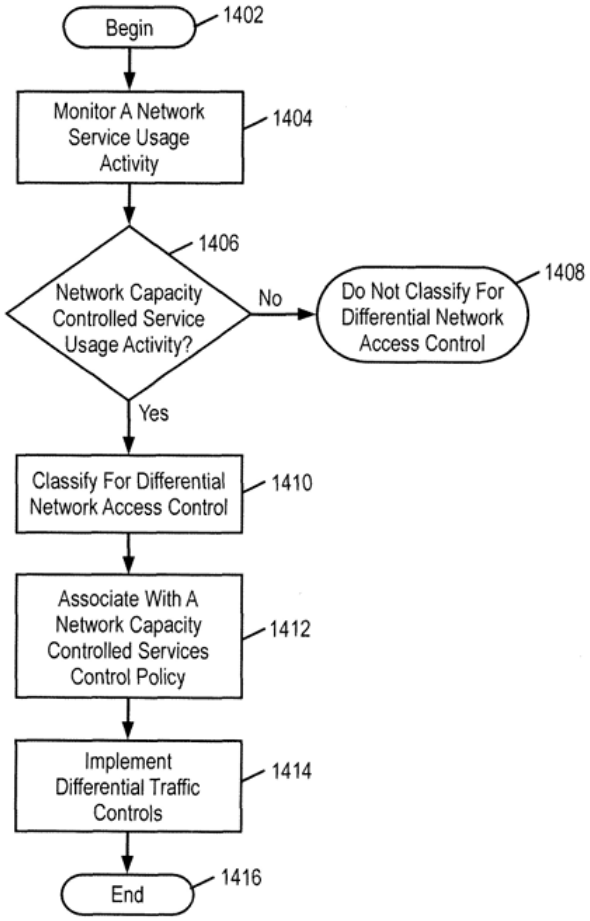

FIG. 14

40. At steps 1404 and 1406, a "service usage activity," such as a "wireless network communication," is "monitor[ed]" and it is "determined" whether the "service usage activity" constitutes a "network capacity controlled service." '541 Patent at 69:5–38. At step 1410, if the "service usage activity" is determined to be a "network capacity controlled service," it is "classified … for differential network access control for protecting network capacity." *Id.* At step 1414, "differential traffic controls" are "implement[ed]" for the "service usage activity." *Id.*

41. Figure 18 discloses a similar process "for device assisted services (DAS) for protecting network capacity." *Id.* at 70:57–59.

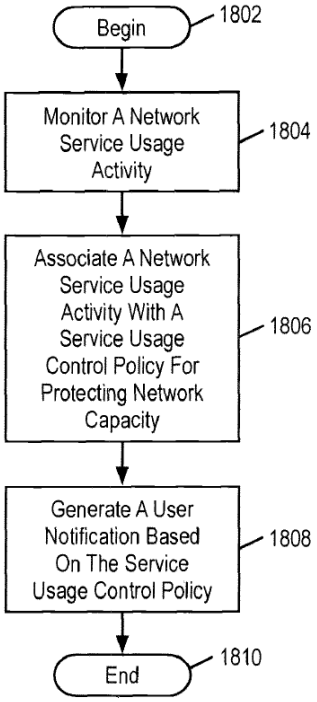

FIG. 18

42. Similar to Figure 14, a "network service usage activity" is "monitor[ed]" and subsequently "associate[ed] … with a service usage control policy (e.g., a network capacity controlled services policy) based on a classification of the network service usage activity" at steps 1804 and 1806 respectively. *Id.* at 70:60–71:1. In the embodiment of Figure 18, the classification results in "a user notification based on the service usage control policy." *Id.* at 71:2–3. This notification may provide the user with information that the particular service usage activity is currently being differentially controlled, a warning that a particular service usage activity may exceed a user's data limit if permitted, an option to "allow" or "block" the particular service usage activity, or other such options. *See id.* at 71:4–42.

B. Prosecution History of the '541 Patent

43. I have reviewed the prosecution history of the '541 Patent.

44. During the prosecution of the '541 Patent, the Applicant first filed a pair of non-substantive preliminary amendments before the application was found subject to an election/restriction requirement. '541 Patent FH, 8/17/2011 Remarks; 07/09/2012 Remarks; 09/06/2012 OA. After the Applicant's election, the Examiner found that all of the elected claims were not allowable. Specifically, the Examiner found that all claims were rendered obvious by U.S. Patent No. 7,228,354 ("Chambliss"). 12/26/2012 Non-Final Rejection at 3. The Applicant amended the claims in response, largely rewriting the independent claim 53 as follows:

> 53. (Currently amended) A ~~method~~**non-transitory computer-readable storage medium storing machine-executable instructions that, when executed by one or more processors of a wireless end-user device, cause the one or more processors to**~~comprising~~:
>
> **identify**~~examining~~ a ~~particular~~ service usage activity **of the wireless end-user device,** ~~to determine if~~ the ~~particular~~ service usage activity **being associated with a first software component of a plurality of software components on the wireless end-user device, the service usage activity comprising**~~fits a set of~~ one or more **prospective or successful communications over a wireless network**~~classification rules that define the particular service usage activity as a background service usage activity~~;
>
> determine**[ing]** whether ~~a condition is satisfied, the condition including a finding that~~ the ~~particular~~ service usage activity **comprises**~~is determined to be~~ a background ~~service usage~~ activity; **[and]**
>
> **determine at least an aspect of a policy based on a user input or based on information from a network element, the policy to be applied if the service usage activity is the background activity, the policy at least for controlling the service usage activity; and**
>
> **if it is determined that**~~when the condition is satisfied, restricting network access of~~ the ~~particular~~ service usage activity **is the background activity, apply the policy**.

06/11/2013 Remarks. The claims were subsequently allowed.

C. Overview of the ’613 Patent

45. The ’613 Patent is titled “Wireless end-user device with differential traffic control policy list having limited user control.” It issued on December 15, 2015 from U.S. Application No. 14/685,511, filed April 13, 2015.

46. The ’613 Patent is a continuation of the U.S. Application No. 14/082,040, which is a divisional of the ’541 Patent. Accordingly, the ’541 and ’613 Patents share an identical specification. Additionally, like the ’541 Patent, the ’613 Patent claims priority to many separate provisional and non-provisional applications, and I have been informed by Defendants’ counsel that Plaintiff asserts that all claims of the ’613 Patent have a priority date of January 28, 2009. For the purposes of preparing this declaration, I have been asked to assume that all claims of the ’613 Patent are, in fact, entitled to a priority date of January 28, 2009.

47. The sole independent claim of the ’613 Patent recites a “wireless end-user device” which includes “non-transient memory” to store a “differential traffic control policy” and a “differential traffic control policy list.” ’613 Patent, cl. 1. A “processor” is then “configured” to, among other things, “classify a wireless network” and classify whether “a particular application … is interacting with the user in the device user interface foreground.” *Id.*

D. Prosecution History of the ’613 Patent

48. I have reviewed the prosecution history of the ’613 Patent.

49. During the prosecution of the ’613 Patent, the Applicant filed a preliminary amendment and an additional non-substantive amendment following an *Ex Parte Quayle* action. 04/14/2015 Preliminary Amendment; 08/24/2015 Response after *Ex Parte Quayle* action. The claims were subsequently allowed.

6. ANALYSIS OF CERTAIN DISPUTED CLAIM TERMS

A. "one or more prospective . . . communications [over a wireless network]" ('541 Patent, Claim 1)

50. I have reviewed the parties' proposed constructions for the term "one or more prospective … communications [over a wireless network]" (the "prospective term"). I understand that Defendants propose that this term is indefinite, and I understand that Plaintiffs contend that this term is not indefinite and should be accorded its "plain and ordinary meaning."

51. I agree with Defendants that the prospective term is indefinite. As I discuss below, the prospective term is ambiguous and fails to inform a POSITA as to the scope of the claims because there is no indication as to what constitutes a "prospective" communication "over a wireless network."

52. Claim 1 (and all dependent claims) of the '541 Patent recite that the "service usage activity compris[es] one or more prospective or successful communications over a wireless network." '541 Patent, cl. 1. This claim language establishes two possible types of a "service usage activity," namely either a "prospective communication over a wireless network," or a "successful communication over a wireless network."

53. In the context of claims and specification of the '541 Patent, the scope of a "successful communication over a wireless network" is sufficiently clear to me. The specification explains that "a network service usage activity is any activity by the device that includes wireless network communication." '541 Patent at 19:8–10. It goes without saying that the purpose of a wireless network communication is to have information in that communication successfully travel over a wireless network to its intended destination—*i.e.* a "successful communication over a wireless network." To this end, the specification discloses a large array of "[e]xamples of a network service usage activity" which uniformly refer to a "connection." *E.g. id.* at 19:12–37

("Examples of a network service usage activity include the following: a voice connection (e.g., coded voice connection or voice over IP (VoIP) connection), a device application or widget connection, a device OS function connection, an email text connection, an email download connection, a file download connection, a streaming media connection, a location service connection, a map services connection …").

54. The specification likewise consistently describes these "connections" as referring to the means for which a communication is delivered over a wireless network. For instance, the specification explains that "in wireless networks, managing the wireless access connection capacity and network access connection resources is important to maintain network performance as network resources/capacity demand increases." '541 Patent at 10:5–8. The specification also refers to "establishing, servicing, conducting, maintaining, and/or closing the necessary network service connections" that are "required to conduct a service activity." *Id.* at 13:3–12. The reference to a "connection" implies that a communication pathway from the device, through the wireless network, and to the destination exists, meaning that this communication would be "successful."

55. By contrast, there is no guidance in the specification as to what constitutes a "prospective communication over a wireless network." From my review, the term "prospective communication"—or even "prospective"—does not appear anywhere in the specification or prosecution history.

56. Nor is there a single definition of what constitutes a "prospective communication" in the relevant field. As I discuss above, the '541 Patent is broadly directed to "differential" control of certain attempts by applications or services on a device to access a wireless network. In the context of claim 1, these applications or services are referred to as "software component[s]," and a particular service usage activity may be "associated with a first software component." '541

Patent, cl. 1. Therefore, claim 1 presumptively refers to an instance where, *e.g.*, an application (the "first software component") sends a communication (the "service usage activity") over the wireless network. However, based on my experience and given the lack of clarity in the claim language, there is no single point in this process in which I could identify a "prospective communication" to the exclusion of other possibilities. A POSITA would not know with reasonable certainty whether a communication should be considered "prospective" based on the perspective of the application, the device operating system, the device modem, the network, etc.

57. To illustrate through an example, a wireless device may include a media streaming application through which a user may access audio or video files that are either stored locally or obtained over the internet. If that application is capable of communicating over a wireless network to obtain media for streaming, that capability itself (even if not currently in use) could be considered a "prospective communication over a wireless network" because that application may perform a communication at some point in the future. Alternatively, it may be the case that an action by this application only becomes a "prospective communication" once a process within that application has determined that a communication over the wireless network must be made. This may be, for example, in an instance where a user has requested a media file which is not stored locally, and the application thus determines that the media must be retrieved from the Internet before it can be provided to the user.

58. Additionally, it may be the case that this request only becomes a "prospective communication" when this application makes a request to the device operating system ("OS") to access the wireless network. For instance, if it is necessary in a particular implementation for a particular application to request permission from the OS prior to access a wireless network prior to doing so, then a POSITA may understand this request to constitute a "prospective

communication." Alternatively, a "prospective communication" may only exist when the application actually sends the content of the communication to the OS for routing over the wireless network itself. The '541 Patent includes extensive disclosures regarding how particular "service usage activities" may be initiated but are subsequently "block[ed]," "throttled," or otherwise not permitted to occur. *E.g.* '541 Patent at 16:13–25; 19:38–58; 31:51–32:31.

59. Finally, even if a communication from an application is sent over a wireless network, there is no guarantee that it would reach its destination and thus become a "successful communication over a wireless network." For instance, the '541 Patent acknowledges circumstances where "the activity is blocked somewhere in the network behind the base station" or are "controlled, blocked, throttled, and/or delayed by central network equipment." *Id.* at 16:13–19. But if this communication is not "successful," the question remains whether the communication nonetheless only becomes a "prospective" communication once it is sent "over the wireless network."

60. Ultimately, the use of "prospective" in the claims introduces a term of degree for which a POSITA could attribute a wide array of meanings. Compounding this issue is the absence of any guidance in the specification regarding what constitutes a "prospective communication over a wireless network," and specifically at what point a communication may be considered "prospective" or "successful."

61. Furthermore, nothing in the claim language itself provides a basis for distinguishing between a "communication," a "prospective communication," and a "successful communication." In particular, claim 1 (from which all other claims depend) recites a determination that a service usage activity "comprises a background activity." '541 Patent, cl. 1. The "policy" recited in the claims is then only "applied if the service usage activity is the background activity." *Id.* As I

discuss above, this is the fundamental purpose of the invention described in the '541 Patent, namely to prevent certain "background activity" from accessing a wireless network in certain instances.

62. In my opinion, this raises the question of why the claims recite a "successful communication" at all. Presumptively, if a communication is "successful," it has already been sent "over the wireless network" that and thus the "policy" (on the device) can have no impact on it whatsoever. The claims nonetheless appear to permit the situation where a "successful communication over a wireless network" nonetheless is somehow determined to be a "background activity" and have a "policy" applied to it. In many embodiments, the application of this policy would have the illogical result of the "successful communication over a wireless network" from being "block[ed]" from leaving the device at all. *E.g.* '541 Patent at 32:21–31; 62:21–25; 71:27–30. It is therefore unclear to me whether, in this circumstance that is clearly permitted by the claims, this "successful communication" would nonetheless be considered a "prospective communication."

63. It is therefore my opinion that "prospective communication … over a wireless network" is indefinite.

B. "background activity" ('541 Patent, Claim 1) / "classify whether a particular application capable of both interacting with the user in a user interface foreground of the device, and at least some Internet service activities when not interacting with the user in the device user interface foreground, is interacting with the user in the device user interface foreground" ('613 Patent, Claim 1) / "the user of the device is directly interacting with that application or perceiving any benefit from that application" ('613 Patent, Claim 6)

64. I have reviewed the parties' proposed constructions for the term "background activity" in the '541 Patent and the terms "classify whether a particular application capable of both

interacting with the user in a user interface foreground of the device, and at least some Internet service activities when not interacting with the user in the device user interface foreground, is interacting with the user in the device user interface foreground" and "the user of the device is directly interacting with that application or perceiving any benefit from that application" in the '613 Patent.

65. I understand that Defendants propose that each of these terms is indefinite, and I understand that Plaintiffs contend that each of these terms should be accorded its "plain and ordinary meaning."

66. I agree with Defendants that each of these terms is indefinite. As I discuss below, each of these terms is ambiguous and fails to inform a POSITA as to the scope of the claims in those patents because there is no disclosure to reasonably establish what constitutes the "foreground" or the "background."

67. As I note above, the '541 and '613 Patents share an identical specification and the '613 Patent is a continuation of a divisional application from the '541 Patent. Accordingly, apart from the language of the claims themselves, the '541 and '613 Patents share identical disclosures regarding what is in the "background" and what is in the "foreground."

68. Wireless devices are capable of executing multiple user-facing (and other) applications simultaneously. Users of these devices may interact with these applications through various media, for instance through the touch-screen on current-generation mobile devices such as those manufactured by Apple, Google, and Samsung.

69. However, while the '541 and '613 Patents recite "background" and "foreground," the disclosures in those patents do not allow a POSITA to identify or differentiate between the two. To begin, the '613 Patent claims specifically refer to the "user interface foreground of the

device." '613 Patent, cl. 1. Based on my experience, it is not clear to me whether this refers to the particular application, the OS, or the device hardware itself. For instance, user applications typically have an interface through which the user may interact with the application, such as to select a particular song on a media application. Additionally, the OS of the device will likewise have an interface through which a user may interact with, among other things, the various applications on the device, such as an interface to open or close applications or toggle between them. Finally, the device itself may not be understood to have an "interface" at all, given that a user cannot interact with the hardware device itself without the intermediary of some application or the device OS itself.

70. This is not a trivial distinction, as a POSITA would understand the "foreground" of each of these three different types of "interface" to comprise different things. If the claim language refers to an application interface, then a POSITA may understand that the interface is the part of application that is currently visible to the user in the "foreground." Alternatively, the OS interface of a device is functionally ***always*** in the "foreground" in the sense that a user is never inhibited from interacting with OS functionalities regardless of whether a particular application is currently in the foreground.

71. Regardless, the '541 Patent simply states that a service usage activity may constitute a "background activity." The '613 Patent provides somewhat more color by reciting an "application" that is capable of both **(1)** "interacting with the user in a user interface foreground of the device," and **(2) "**at least some Internet service activities when not interacting with the user in the device user interface foreground." In short, presuming that the claims refer to an application interface, an application is only in the "foreground" specifically when it is "interacting with the user."

72. The specification provides some differentiation between "background" activities and other activities. The specification refers to a "background class" which is "generally used for lowest priority service usages (e.g., typically used for e-mail with and without downloads/attachments, application software updates, OS software updates, and/or other similar applications/functions)." '541 Patent at 23:1–5; *see also id.* at 32:21–26 ("In some embodiments, higher QoS level traffic cannot be throttled in such circumstances, such as VOIP traffic where real-time guaranteed bit rate is important to meet user service needs or expectations, while lower priority traffic such as interactive browsing and/or background download are throttled and/or blocked.").[2] The specification further discloses "classifying network service activities associated with one or more applications or OS functions to a background service class and differentially controlling the background service class traffic." *Id.* at 18:39–55.

73. However, the specification provides essentially no explanation as to what constitutes a "foreground" activity. The sole reference to differentiation between "foreground" and "background" activities is disclosed in a single sentence in connection to Figure 27, which states:

> The network service usage classification engine 2708 can categorize the traffic stored in the application behavior datastore 2706 based on, e.g., network type, time of day, connection cost, whether home or roaming, network busy state, QoS, and **whether the particular service usage activity is in foreground of user interaction or in the background of user interaction**, or other characteristics that are obtained from network service usage analysis or through other means.

'541 Patent at 107:49–57. The only other references to "foreground" in the specification provide no further clarity at all. *See id.* at 78:32–35 ("In some embodiments, DAS for protecting network capacity includes differentially accounting and/or differentially charging for network capacity

[2] Because the '541 and '613 Patents share a specification, I cite to the '541 Patent specification throughout this section for ease of reference.

controlled services and foreground services."); 96:17–22 ("In some embodiments, the network capacity controlled services list includes network capacity controlled services, non-network capacity controlled services (e.g., foreground services or services based on various possibly dynamic criteria are not classified as network capacity controlled services.)"). Based on these scant disclosures, I am unable to even infer the boundaries of the "foreground" (or "background") as that term is used in the claims.

74. Compounding this confusion, claim 6 of the '613 Patent recites that "the particular application is interacting with the user in the device user interface foreground when **the user of the device is directly interacting with that application or perceiving any benefit from that application**." '613 Patent, cl. 6. I have been informed that, through a doctrine called claim differentiation, independent claims are assumed to have a broader scope than the dependent claims. However, the scope of claim 6 would eclipse everything a POSITA would understand to comprise "interacting with the user" as it is recited in independent claim 1. For instance, this suggests there is some other way a user can be indirectly interacting with an application without the user perceiving a benefit from that application. But there is no guidance on what that could be, and a POSITA would not know with reasonable certainty the bounds of "interacting with the user" as recited in independent claim 1.

75. Indeed, one of the few disclosures in the specification that actually distinguishes between foreground and background interaction (albeit implicitly) still refers to the user "directly interacting" with the application: "For example, even when the user is not directly interacting with or benefiting from this type of application, the application can be running in the background and continuing to consume potentially significant network resources." '541 Patent at 14:47–51.

76. Likewise, except for the "background class" I discuss above, all other "classes" of applications similarly require direct interaction with the user. The specification defines a "conversational class" of applications which "is typically used for Voice Over IP (VOIP) and video telephony, in which users of such services benefit from the short delay features of the conversational class." *Id.* at 22:50–56. The "conversation class" plainly requires direct user interaction, *i.e.* a user speaking over the VOIP or video connection. The specification also defines an "interactive class" of applications which "is generally intended for traffic that allows delay variation while requiring reasonably low response time (e.g., web browsing or other applications in which the channel can be unused for long periods of time but when a user makes a request for a new page/data, the response time should be reasonably low)." *Id.* at 22:56–63. Likewise, the "interactive class" also requires direct user interaction because the "user makes a request for a new page/data." *Id.* at 22:63–23:1.

77. Put simply, there is nothing left to be captured by the "user interaction" recited in claim 1 of the '613 Patent given what is recited by claim 6. Claim 6 already captures any circumstance where a user is "directly interacting" with an application, which is in the abstract the scope I would accord to "interacting with the user" as that phrase is used in claim 1.

78. Additionally, however, Claim 6 ***also*** includes, in the scope of "interacting with the user," any instance where the user is "perceiving any benefit" from a given application. In my opinion, this exceeds the scope I would accord even to "interacting with the user in the user device interface foreground" as that phrase is used in claim 1. This is because there are instances where a user may perceive a benefit from the application that is not in the "foreground" under any reasonable definition of that term. For instance, if a user is currently playing a song from a media application on their device, but the user has toggled that application to the "background" and is

currently checking their email inbox on the screen of their device, that user is undoubtedly "perceiving a benefit" (the song) from that application while it is in the background.

79. Accordingly, the scope of claim 6 further prevents me from determining the boundaries of claim 1 for the additional reason that the scope of claim 6 appears to ***exceed*** any reasonable scope of the term "interacting with the user in the device user interface foreground" in claim 1, from which claim 6 depends.

80. Thus, the claim language read in light of the specification fails to inform a POSITA with reasonable certainty about the scope of "interacting with the user" as recited in claim 1. In light of the apparent scope of claim 6 of the '613 Patent, it is my opinion that the element of claim 1 that recites "classify whether a particular application capable of both interacting with the user in a user interface foreground of the device, and at least some Internet service activities when not interacting with the user in the device user interface foreground, is interacting with the user in the device user interface foreground" is indefinite.

81. For the same reason, the "background activity" recited in claim 1 of the '541 Patent is also, in my opinion, indefinite. The '541 and '613 Patents share a specification and thus share the same disclosures defining the difference between the "foreground" and the "background." Because a POSITA would not be able to determine what constitutes a "foreground" activity in light of these disclosures, neither would a POSITA be able to determine what constitutes a "background activity."

82. Finally, claim 6 of the '613 Patent is, in my opinion, indefinite because it relies on a user's subjective experience. Specifically, each of the three "classes" of application I discuss above—*i.e.* the "conversational class," "interactive class," and "background class"—all plainly

provide a "benefit" to the user. For instance, the specification discloses that the "background class" includes "email," which is undoubtedly a benefit to a user of the wireless device.

83. However, I am unable to determine the scope of "perceives any benefit" as recited in claim 6 because it relies on a user's own perception of the benefits that each of these "classes" of applications provides, and neither the claim language nor the specification provide guidance on what the boundaries of a "benefit" entails. A POSITA would not know with reasonable certainty the boundaries of what a "benefit" entails to a user nor how to determine when a user "perceives" that benefit. For instance, it is not clear to me whether a user "perceives any benefit" from an update to their email application (a "background class" activity) if the user has not yet checked their updated inbox for any new emails. Likewise, it is not clear to me whether a user "perceives any benefit" from a VOIP call during a time when the user has walked away from their device to answer their front door. Put simply, whether a user "perceives" "any benefit" from a particular application on their device is determined wholly by their own subjective awareness of and actions on that device.

84. Therefore, it is my opinion that claim 6 of the '613 Patent, which recites that "the user of the device is directly interacting with that application or perceiving any benefit from that application," is indefinite.

85. This declaration and my opinions herein are made to the best of my knowledge and understanding, and based on the material available to me, at the time of signing this declaration. I reserve the right to amend or supplement my opinions based on new information, including any claim construction arguments or expert opinions that Headwater offers in this case and/or any other information I deem relevant to my analysis. I declare under penalty of perjury that the foregoing is true and correct.

Executed this 24th day of August, 2024 in Lewisville, Texas

Don Turnbull, Ph.D.

EXHIBIT A

Don Turnbull, Ph.D.

Overview

Software developer, designer and researcher with over 30 years' experience. Contributor to multiple commercially successful consumer and enterprise applications including Artificial Intelligence-drive applications, Data-centric systems, Search systems, Content Management Systems, CASE tools, desktop utilities, Mobile applications, and ecommerce Web sites. Accomplished researcher and creator of innovative, patented and trade-secreted technologies related to information retrieval, behavioral modeling, user interfaces, content organization and analytics. Author of numerous academic publications including: a book on Web-based information seeking and knowledge work, articles on human-computer interaction design, personalization for information retrieval and recommender systems, as well as numerous definitive works on information architecture methodologies, designs and implementations.

Principal – InfoTheory/Don Turnbull, ULC **2002-ongoing**

Advising software companies, design agencies and information services corporations on the research and development of systems architectures, data science activities and human-computer interaction. Directing the design of multi-platform applications (desktop and mobile) for consumer-oriented information systems including Web, smartphone and tablet interfaces, information architectures and ecommerce recommendation systems as well as advising on future development based on data-centric architectures and for re-designing existing systems in use.

Analyzing intellectual property, patent portfolios and innovative technologies to author reports, research software architecture and software development methods, create new IP, advise intellectual asset development, as well as serve as an expert in patent-related cases with prior art, infringement, or validation issues.

Consulted with architectural engineering practice to design a software platform to classify, aggregate and operationalize a wide set of parametric environmental data including sensor networks, geographic and map data, governmental energy datasets and resources, weather behavior and real estate statistics to visualize and enable engineers to plan, design and construct energy efficient systems from individual building to city scale.

Designed and prototyped information retrieval systems and application programming interfaces for consumer and enterprise search systems involving indexing, tagging and faceted-metadata methods. Created techniques and organization schemes to instrument systems for collection and analysis of empirical behavioral data logs from Web site usage and user-generated content. Developed data models and interaction strategies for consumer and vertical channel mobile devices for information retrieval, storage and management.

Advised and coordinated a very large, multiple partner contract systems development effort as the technical architect for a back-office ecommerce enterprise portal that included vendor tool selection, managing and negotiating among partners for project management and strategic goal definition. Devised and configured analytics standards and tools, as well as implementing analysis results to provide guidelines for site information architecture and user experience designs.

Designed and directed creation of a knowledge management system to provide efficient development workflow, search functionality and knowledge discovery from intranet information sources including the design and deployment of enterprise wikis, blogs, social networking and workgroup collaboration tools, source code version control and office documents including (OLAP) reporting and financial applications. Lead efforts to build upon open source applications and protocols including novel interface designs, autonomous agents and collaborative filtering to improve information access and use in the organization.

Consulting Partner – Aqua M&A **2019 - present**
Advising and mentoring companies with disruptive IP for emerging and high-growth markets. Applying specialized domain experience in areas of Computer Science including Artificial Intelligence, Data Science and Distributed Systems to evaluate and instruct on technology innovation.

Advisor – Singulos Research Inc. **2019 - present**
Providing strategy, planning, and technical evaluation of applied Machine Learning solutions for Augmented Reality Dynamic Object Comprehension. Guiding intellectual property invention and providing tactical analysis.

Advisor – ThinkCX **2016 - present**
Directing research efforts for large-scale machine learning platform for collecting, measuring, and predicting user behavior across mobile and networked devices and geo-locational activity traces. Advised on strategic use and extension for a social media analysis framework for user behavior prediction. Advising on the startup process, general technology and inventing as well as patent inventions.

Advisor – University of Texas at Austin Technology Incubator **2009-2011 & 2013 - ongoing**
Mentor and Advisor with the University of Texas at Austin, Austin Technology Incubator and IC^2 (Innovation, Creativity and Capital) Institute to engage local and international technology companies (primarily software startups) in advancing research, providing strategic expertise, intellectual property evaluation, market assessment and assisting in designing products for market.

Research Computer Scientist – Tapstream **2013**
Researched and invented novel systems and designs in desktop and mobile computing, data science, user modeling and analytics domains to produce intellectual property for existing and future technologies. Investigated the state of the art and the competitive landscape for software services and advising directions for future product development.

Principal Data Scientist & Architect – Wyley Interactive **2012**
Researched and developed algorithms, data sets and software architectures for a mobile games discovery, recommendation, and rewards system. Created intellectual property including system designs, algorithms, and computational methods for patent-pending systems. Wrote and coordinated research grants and other funding programs.

Architected an empirical business intelligence analytics platform for understanding and predicting user acquisition, monetization strategy, app distribution, gameplay telemetry, operation costs and social interaction in the mobile gaming space.

Assistant Professor – University of Texas at Austin **2002-2009**
Created and taught graduate-level courses and development labs in Information Architecture, Interaction Design & Human Computer Interaction (HCI), Web Analytics, Web Information Retrieval Evaluation & Design (search), the Semantic Web and Knowledge Management systems. Investigated very large-scale data mining systems and algorithms (including Web use data for personalization), interface designs for multimedia access and Web search engines. Co-Principal Investigator for Web content classification and collaborative filtering system (the OpenChoice Project) including system architecture, algorithm evaluation, interface design and user coordination. Conducted and collaborated on Information Retrieval system development for blog analysis and topic distillation tasks including spam detection and initial sentiment analysis.

Explored search engine technologies (multimedia, indexing, interaction), search engine optimization (natural organic search, personalized search, sponsored advertising search) as well as creation and empirical analysis of behavioral model of search user experience towards improving the search process.

Advised graduate students and managed research team efforts for information technology research and development including Semantic Web applications, mobile device interfaces, Content Management Systems, Web browser software analysis, Web accessibility evaluation, Web link mining and analytics, information architecture design methodologies, and Web advertising plans and tools.

Director of Advanced Development − Outride, Inc. (acquired by Google, Inc.) 2000-2001
Created and coordinated intellectual property assets including patent applications and licensed patents from Xerox PARC as well as original work developed at Outride. Authored multiple patents relating to personal relevance models for information retrieval, information privacy and e-commerce systems in networked and mobile environments. Worked with attorneys to manage, track, develop and revise patent portfolio. Authored several trade-secreted technologies, patent applications and at least one patent (7,089,237) for interfaces and systems that display content for commerce activities in mobile and/or networked environments which could include desktop, smartphone, tablet or set-top devices.

Initiated and managed Competitive Intelligence efforts to scan for emerging technologies including research reviews, attending conferences and analyzing competitor technologies. Organized intelligence resources for engineering and legal purposes to protect and augment existing intellectual property. Maintained the Competitive Intelligence database as a knowledge management activity and served as a technical strategic advisor for business partners.

Acted as research advisor for all corporate data mining, interface designs and usability studies activities. Worked closely with User Interface design team to design product specifications for an application to search the Web; manage bookmarks; view and search Web use history; and interact with a directory of Web-based resources. Designed high-level technical architecture and interface for a Web browsing privacy application to enable users to control and edit data collected about their Web use activities.

Managed Metrics project with vendors to provide a value proposition for Outride technology for business development. Selected an external testing agency; designed the initial tests; determined evaluation criteria; selected competing technologies; designed data collection methods; analyzed test data; and edited the final report. This extremely successful project served as a key asset in demonstrating Outride technology to investors, business partners and industry analysts and additionally used extensively in press releases and corporate product literature.

Research Scientist & WebTracker Development Lead − University of Toronto 1997-2000
Planned and implemented a 16-month study to develop a comprehensive understanding of corporate Internet use utilizing a synthesis of data collection and analysis methods including an initial survey questionnaire; software to collect use data gathered with a custom-developed Web tracking application; and interviews with study participants.

Analyzed data using qualitative and quantitative methods to test hypotheses of new models of Information Seeking and Information Retrieval behavior. Used study results to make recommendations on improving organizational Knowledge Management and individual Web use techniques, as well as to design new software tools to coordinate and leverage organizations' intranet and Internet use.

Designed and prototyped *WebTracker*: a client-side data collection instrument for transparently logging Web browser use. Researched data collection methods, instruments for Internet protocols and network-enabled client applications. Automated the data mining of WebTracker logs with customized analysis tools to build both individual and aggregate models of Web use. Initiated consortium with other research institutes to expand WebTracker use.

Lead Technical Architect: Internet Applications − IBM Interactive Media Group **1996**
Designed and authored specifications for hybrid (CD-ROM and Internet) *World Book-IBM Interactive Multimedia Encyclopedia* involving data formats, user interface, indexing structures and versioning controls. Researched and co-developed patented the TRUE/IP protocol for registering, updating and exchanging client-server information via the Internet. Prototyped large-scale collection and analysis of client application and Internet use data.

Knowledge Management Researcher − AT&T **1995**
Designed and constructed ISO 9000-compliant Web-based Knowledge Management system for corporate technical information. Researched and developed an iterative methodology to develop, organize and publish interactive documents using object-oriented content classification and user-centered design principles. Trained technical staff in this new methodology including coursework and system templates.

Sr. Information Developer − MicroHelp, Inc. **1994-1995**
Programmed Microsoft Windows utility software application including file metadata analysis and duplication detection algorithms. Designed and prototyped user interface for *UnInstaller for Windows* (the best-selling utility in 1994, over 4 million sold). Conducted usability studies including designing test scenarios; user modeling; monitoring and recording test data; and analyzing resulting data. Developed scripts to automatically generate hypertext documentation from print documentation. Designed and programmed interactive multimedia applications to demonstrate software products.

Technical Editor − Macmillan/SAMS Publishing **1994**
Edited object-based visual programming and software development books for technical accuracy, initially for *ObjectView*, a product I designed for KnowledgeWare. Wrote and tested programming examples and database overview chapters used in various publications.

Methodologist − KnowledgeWare, Inc. **1991-1994**
Managed project team through development cycle of Computer-Aided Software Engineering (CASE) tools including finalizing requirements, organizing development team, running status meetings, reviewing documentation, testing, prioritizing development issues and designing future enhancements. Used industry standard software engineering methodologies and frameworks (including Information Engineering and Rapid Application Development) for large-scale software projects.

Researched software engineering methodologies to design methods and technologies for next generation CASE tools. Implemented designs included an object-based interface builder and large-scale hypertext information authoring and content management applications using graphical objects, with SGML (GML) formatting and semantics, WYSIWYG editing as well as link management. Designed and reviewed all graphical user interfaces for compliance. Created all corporate usability and interface design standards including task analysis methods to improve products.

Education

Ph.D. Information Studies - University of Toronto, 2002

Dissertation: "Knowledge Discovery in Databases of Web Use: A Search for Informetric and Behavioral Models of Web Information Seeking"

M.S. Information, Design & Technology - Georgia Institute of Technology, 1995

Thesis: "Object-Oriented Information Development: A Methodology and System for Large-Scale Hypertext Documents

B.A. General Studies - University of Texas at Arlington, 1988

Knowledge Engineering (Computer Science & Cognitive Science)

Books

Choo, C. W., Detlor, B. & Turnbull, D. (2000) Web Work: Information Seeking and Knowledge Work on the World Wide Web. The Netherlands: Kluwer Academic Publishers.

Book Chapters

Dillon, A., & Turnbull, D. (2010) Information Architecture. Encyclopedia of Library and Information Science, 2010, (3rd Ed.). Taylor & Francis.

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Selected Journal Articles

Turnbull, D., & Bright, L. F. (2008). Advertising Academia with Sponsored Search: An Exploratory Study Examining the Effectiveness of Google AdWords at the Local and Global Level. International Journal of Electronic Business, 6(2), 149-171.

Pitkow, J., Schutze, H., Cass, T., Cooley, R., Turnbull, D., Edmonds, A., et al. (2002). Personalized Search: A Contextual Computing Approach May Prove a Breakthrough in Personalized Search Efficiency. Communications of the ACM, 45(9), 50-55.

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Turnbull, D. (2007). Rating, Voting & Ranking: Designing for Collaboration & Consensus. Paper presented at the Association of Computing Machinery Computer Human Interface Conference (SIGCHI), San Jose, CA.

Turnbull, D. (2006, May 23, 2006). Methodologies for Understanding Web Use with Logging in Context. Paper presented at The 15th International World Wide Web Conference, Edinburgh, Scotland.

Dillon, A., Kleinman, L., Bias, R., Choi, G. O., & Turnbull, D. (2004). Reading and Searching Digital Documents: An Experimental Analysis of the Effects of Image Quality on User Performance and Perceived Effort. Proceedings of the American Society for Information Science and Technology Annual Meeting, 2004. Information Today, 267-273.

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Turnbull, D. (1999). Interacting with Recommender Systems. Paper presented at the ACM SIGCHI (Computer-Human Interface) Workshop on Recommender Systems, Pittsburgh, PA.

Choo, C. W., Detlor, B., & Turnbull, D. (1999). Information Seeking on the Web - An Integrated Model of Browsing and Searching. Paper presented at the Proceedings of the 62nd Annual Meeting of the American Society of Information Science, Washington, D.C.

Choo, C. W., Detlor, B., & Turnbull, D. (1998). A Behavioral Model of Information Seeking on the Web - Preliminary Results of a Study of How Managers and IT Specialists Use the Web. Paper presented at the Proceedings of the 61st Annual Meeting of the American Society of Information Science, Pittsburgh, PA.

Selected Conference Presentations, Panels & Posters (refereed)

Turnbull, D. (2010). Quantitative Information Architecture. Presented at the American Society of Information Science & Technology Information Architecture Summit, Phoenix, AZ.

Turnbull, D. & Tolva, J. (2010). Metropolitan Information Architecture. Presented at the American Society of Information Science & Technology Information Architecture Summit, Phoenix, AZ.

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Turnbull, D., Campbell, D. G., & Fast, K. V. (2007). The Grand Challenges in Information Architecture. Presented at the American Society of Information Science & Technology Information Architecture Summit, Las Vegas, NV.

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Turnbull, D., & Efron, M. (2006). OpenChoice: A Platform for Web Content Classification & Filtering. Paper presented at the 15th International World Wide Web Conference Open Source Workshop, Edinburgh, Scotland.

Turnbull, D., Dillon, A., Morville, P., Kaplan, N., Froehlich, T. J., & Robins, D. (2005). The Process of Curriculum Development for Information Architecture. Presented at the American Society of Information Science & Technology Information Architecture Summit, Montreal, Quebec, Canada.

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Turnbull, D., Mackenzie, M., & Edgar, B., Hersberger, J.A. & Kasten, J. (2004). Finding and Managing Social Networks as Functions of Technology Use: Applying Quantitative Methods to Determine Communities of Practice. Presented at the American Society of Information Science and Technology Annual Meeting, Providence, RI.

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Burkart, J., Turnbull, D., Vigil, A., Switzky, A., Miranda, D., & Liaw, L. (2004). XIA@UT: An Extreme Makeover. American Society of Information Science & Technology Information Architecture Summit. Feb. 28, 2004. Paper presented at the American Society of Information Science & Technology Information Architecture Summit, Austin, TX.

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Selected Conference Workshops (refereed)

Turnbull, D. (2006, November 4) The Effects of Information Overload on Information Seeking & Use. Workshop paper for the American Society of Information Science and Technology Annual Meeting, SIG USE workshop. Austin, TX.

Turnbull, D. (2006, May 23) OpenChoice: A Platform for Web Content Classification & Filtering. Open Source Workshop at the 15th International World Wide Web Conference. Edinburgh, Scotland.

Turnbull, D. (2003, Oct 18) New Approaches for Studying and Building Information Seeking Models: A Possible Hybrid Approach. SIGUSE Workshop on Information Seeking theory for the American Society of Information Science and Technology (ASIST) 2003 Annual Meeting, Long Beach, CA.

Selected Invited Talks & Panels

Turnbull, D. (2011, October 31). New Directions in Taxonomy (Conference Keynote). KMWorld Enterprise Search Summit/Taxonomy Boot Camp, Washington D.C.

Turnbull, D. (2011, March 12). Left Brain Search = Google, Right Brain Search = X?. South by SouthWest Interactive, Austin, TX.

Turnbull, D. (2010, July 13). Quantitative UX. Toronto UX Irregulars. Toronto, ON.

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Turnbull, D. (2005, March 13). Leveraging and Augmenting Solipsism. South by SouthWest Interactive, Austin, TX.

Turnbull, D. (2004, March 14). Revolutionary Search Technologies. South by SouthWest Interactive, Austin, TX.

Turnbull, D. (2004, March 11). Designing for Pervasive Computing. Austin Mobility Roundtable, the Third Annual Meeting of the Global Mobility Roundtable, Austin, TX.

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Other Publications

Turnbull, D. and Hirsh, S. (Eds) (2021) 84th Annual Meeting of the Association for Information Science and Technology, Industry Series Proceedings. John Wiley & Sons, Inc.

Bagheri, E., Cheung J., and Turnbull, D. (Eds) (2018) 31st Canadian Conference on Artificial Intelligence, Industry Track Proceedings. Springer Intl Publishing Subseries on Lecture Notes in Computer Science.

Turnbull, D., Jansen, B. J., Hawkey, K., Kellar, M., & Edmonds, K. A. (2007). Introduction to Logging Traces of Web Activity special issue. IEEE Journal of Web Engineering, 6(3), 193-195.

Turnbull, D. (1998). Data Mining Web Use: Discovering Patterns and Models of Web Information Seeking Behavior using WebTracker Software Application. IBM Center for Advanced Studies Conference '98 (CASCON 98), Toronto, ON.

Selected Professional Associations and Committees

- Association for Computing Machinery (ACM)
  - SIGCHI Conference Program Committees and Reviewer
  - SIGIR Conference on Human Information Interaction and Retrieval
  - UIST Symposium on User Interface Software and Technology
  - SIGCHIIR Conference on Human Information Interaction and Retrieval – Industry Day Chair
- Association for Information Science and Technology (ASIS&T)
  - Industry Series Co-Chair
  - Special Interest Groups Lead and Co-Chair
- Association for the Advancement of Artificial Intelligence (AAAI)
- Canadian Artificial Intelligence Association – Chair of Industry Track
- Institute of Electrical and Electronics Engineers (IEEE)
- Python Software Foundation
- World Wide Web Consortium
  - WWW Conferences Program Committees
  - WWW Conference Browsers and User Interfaces Co-Chair
  - W3C Web Characterization Activity

Fellowships, Scholarships and Grants

- University of Texas Dean's Fellowships 2003, 2006, 2007 & 2008
- IMLS - OpenChoice Classifier & Social Filtering Engine 2005-2007
- Temple Foundation Fellowship 2004 & 2005
- University of Texas at Austin Teaching Fellowship 2004
- Google Search Appliance Research Grant 2003
- University of Texas at Austin John P. Common Teaching Fellowship 2003
- Microsoft ClearType Research Grant 2003
- University of Toronto Open Fellowship 1997, 1998 & 1999.
- School of Graduate Studies Travel Grant 1999
- Mary H. Beatty Fellowship 1996

Patents and Patent Applications

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2. **Bid for Position, LLC** v. AOL, LLC, U.S. District Court for the Eastern District of Virginia, Case No. 2:07-cv-00582-JBF-TEM.
3. Moricz v. Google Inc. **U.S. District Court Western District of Washington at Seattle**. Independent Expert to assist the court. Case No. 10-cv-01240-RSL.
4. SFA Systems, LLC v. **Amazon.com, Inc**., et al. U.S. District Court for the Eastern District of Texas Tyler Division, Case No. 6:11-cv-00052-LED.
5. Softview LLC v. **Motorola Mobility Inc**., et al. U.S. District Court for the District of Delaware, Case No. 1:10-cv-00389-LPS.
6. Rotatable v. **Rackspace, US, Inc., et al.** U.S. District Court for the Eastern District of Texas Marshall Division and Inter Partes Review, USPTO PTAB. Docket: 47015.115.
7. **National Association of Realtors** v. Data Distribution Technologies. USPTO PTAB Case No. IPR2016-01075.
8. Global Sessions LP and Global Sessions Holdings SRL v. **Comerica, TD, et al.** U.S. District Court for the Western District of Texas, Case Nos.: 1:13-CV-688-SS; 1:13-CV-692-SS, 1:13-CV-691-SS.
9. Enterprise Systems Technologies, S.A.R.L. v. **Apple Inc.**, USPTO PTAB and Civil Action Nos.: 14-cv-765-LPS.
10. Enterprise Systems Technologies, S.a.r.l. v. Microsoft (**Apple**, **HTC** & **Google** as interveners). International Trade Comission Case No. 337-TA-925.
11. **Apple Inc., Eventbrite Inc.,** and **Starwood Hotels & Resorts Worldwide, Inc., et al.** v.Ameranth, Inc., USPTO PTAB CBM2015-0008, CBM2015-00080, CBM2015-00082, CBM2015-00096, and CBM2015-00097.
12. Queen's University at Kingston v. **Samsung Electronics Co, LTD**. Inter Partes Review, USPTO PTAB Case No. IPR2015-00583.
13. **Express Mobile, Inc.** v. BigCommerce, U.S District Court for the Easter District of Texas Marshall Division, Case No. 2:17-cv-00130.
14. **Express Mobile, Inc.** v. eGrove Systems Corporation, U.S. District Court of Delaware, Case No. 1:17-cv-703-RGA.
15. Traxcell Technologies, LLC v. **AT&T Corp.** and **AT&T Mobility, LLC, Verizon Wireless Personal Communications LP** and **T-Mobile USA, Inc.**, U.S. District Court for the Eastern District of Texas Marshall Division, Case Nos. 2:17-cv-00718, 2:17-cv-00719, 2:17-cv-00720 and 2:17-cv-00721.
16. Seven Networks, LLC. v. **Google, LLC**, U.S. District Court for the Eastern District of Texas Marshall Division, Case No. 2:17-CV-442-JRG.
17. Fintiv v. **Apple, Inc.**, Western District of Texas, Austin Division, Case No. 6:18-CV-372-ADA.

18. Intellectual Ventures II LLC. v. **Kemper Corporation, et al.** US District Court for the Eastern District of Texas Tyler Division, Case No. 6:16-cv-00081-JRG.
19. Roku, Inc. v. **Universal Electronics, Inc**., Inter Partes Review, USPTO PTAB Case No. IPR2019-01615.
20. **Quibi Holdings, LLC** v. JBF Interlude 2009., Inter Partes Review, USPTO PTAB Case Nos. IPR2020-01547 and IPR2020-01549.
21. EcoFactor, Inc. v. **Google, LLC**, U.S. District Court for the Western District of Texas Waco Division, Case No. 6:20-CV-00075.
22. Eolas Technologies Inc. v. Amazon.com Inc, et al. including **Google, LLC**, U.S. District Court for the Northern District of California, Case No. 17-cv-03022-JST.
23. MasterObjects, Inc. v. **Amazon.com Inc**, U.S. District Court for the Northern District of California San Francisco Division, Case No. 5:20-cv-08103-WHA (KAW).
24. Roku, Inc. v. **Universal Electronics, Inc**., Inter Partes Review, USPTO PTAB Case Nos. IPR2021-00455 and IPR2021-00758.
25. **American Airlines, Inc.** v. Sabre Holdings Corporation, et al. District Court of Tarrant County, Texas, 236th Judicial District. Case No. 236-326225-21.
26. **Twitter, Inc.** v. Palo Alto Research Center, Inc.., Inter Partes Review, USPTO PTAB Case Nos. IPR2021-01398, IPR2021-01430 and IPR2021-01458.
27. Leadfactors, LLC v. **Cisco Systems, Inc.** Superior Court of The State of California, County of Santa Clara. Case No. 1:13 CV 247926.
28. Motion Offense, LLC v. **Google, LLC**. Western District of Texas, Waco Division. Case No. 6:21-cv-00514-ADA.
29. Almondnet, Inc and Intent IQ, LLC v. **Microsoft Corporation.** USPTO PTAB and Western District of Texas, Waco Division. Case Nos. 6:21-cv-00897-ADA, IPR2022-01324, IPR2022-01319.
30. Innovaport LLC v. **Target Corporation**. Western District of Wisconsin. Case No. 3:22-cv-00425.
31. SafeCast Limited v. **AT&T Corp**. and **Verizon Communications, Inc**. and **Microsoft Corporation**. Western District of Texas, Waco Division. Case Nos. 6:22-cv-00676-ADA, 6:22-cv-683-ADA, and 6:22-cv00983-ADA.
32. SafeCast Limited v. **Google, LLC**. U.S. District Court Northern District of California. Case No. 5:23-cv-03128-PCP.
33. **NEC Corporation** v. Peloton Interactive, Inc. U.S. District Court for the District of Delaware. Case No: 1:22-cv-00987-CJB.
34. Nantworks, LLC, and Nant Holdings IP, LLC v. **Bank of American Corporation** and **Bank of America, N.A**. Central District of California. Case No. 2:20cv-07872-GW-PVC.
35. Pardalis Technology Licensing, LLC v. **International Business Machines Corporation**. Eastern District of Texas, Marshall Division. Case No. 2:22-cv-00452-JRG-RSP.
36. Headwater Research LLC v. **Samsung Electronic Co., Ltd** and **Samsung Electronics America, Inc.** Eastern District of Texas, Marshall Division. Case No. 2:23-cv-00103-JRG-RSP.